

3.12 NOISE

3.12.1 Applicable Sections in FERC Documents

Please refer to Section 3.12.2 in the FERC Final EIS and Resource Report 9, Air and Noise Quality, in Exhibit F-1 of GSX-US's original application to FERC.

3.12.2 Issue [39: Noise Abatement Measures](#)¹

Issue Summary

Description of Problem

A pipeline noise impact and mitigation plan should be developed and summarized in the SEPA review documentation.

Ecology Requirement

Develop and summarize pipeline noise impact and a mitigation plan in the SEPA review documentation to allow for a full evaluation and public review of impacts and mitigation measures.

Affected Environment

No additional analysis required.

Impacts

Proposed Action

GSX-US

Existing Noise Regulations. FERC requires that the noise attributable to a new compressor station or other pipeline facilities be less than or equal to 55 dBA at the nearby noise sensitive areas (including residences, schools, hospitals, churches, playgrounds, farms, and camping facilities). At the state level, Chapter 173-60 of the Washington Administrative Code (WAC) establishes maximum allowable noise levels. Based on land-use characteristics, areas are categorized as either Class A, B, or C zones, or environmental designations for the purpose of noise abatement. The Cherry Point compressor station and the metering facilities at the Sumas interconnect facility are located in a Class C area; the nearby residences are categorized as Class A areas. Washington noise regulations (WAC 173-60-040) limit the noise levels from a Class C noise source affecting a Class A receiving property to 60 dBA (day) and 50 dBA (night). Nighttime hours are considered to be 10 p.m. to 7 a.m.

No other federal or Washington State regulations related to noise would apply to the proposed GSX-US pipeline. Further, there are no equivalent regulations for noise impacts on fish or

marine mammals. Although there are federal and state laws to prevent the harm and harassment of protected species (e.g., minimum proximity for whale watching), there are no known noise regulations or standards to safeguard the safety and comfort of marine animals.

Previous Noise Studies. Based on modeling data and information gathered from an existing natural gas transmission pipeline in the Strait of Georgia, GSX-US provided reports suggesting that the pipeline would produce low-frequency and low-energy sounds that could be detected near the pipeline (Birch et al. 2000; Glaholt 2000; Potter 2000). The intensity levels of these sounds would normally be less than ambient conditions. Generally, baleen (humpback, gray, and minke) whales that may occasionally move through the area would be the only marine mammals that might be able to detect these low-frequency sounds. Although baleen whales might detect sounds from the pipeline, avoidance behaviors are not known to occur at the low intensity levels that would be generated by the pipeline (Potter 2000; Richardson et al. 1995). Other marine mammals, such as killer whales and harbor porpoises, are thought to be most sensitive to sounds of higher frequency than generally would be emitted from the pipeline. The FERC staff concluded that they do not expect operation of the pipeline to adversely affect marine mammals. However, the FERC EIS did include a recommendation that GSX-US gather data on the sounds emitted from the marine pipeline after it begins operation.

Supplemental Noise Studies. To further assess the issue of noise impacts to marine animals, GSX-US commissioned two additional studies of the noise generated by the marine pipeline that more accurately reflect GSX pipeline features and operating conditions. ~~Two additional studies were conducted for GSX-US to analyze the operation of the Cherry Point compressor station and gas flow through the pipeline. The studies assessed the potential for sounds to be emitted from the walls of the marine pipeline.~~ Those studies are:

- Kitech, Paul D. P.E. February 2003. GSX Canada Pipeline Project: Results of a Supplemental Acoustical Analysis of the Potential Noise of the Underwater Pipeline Associated with the GSX Project. Hoover & Keith, Inc.
- Marko, J. R. February 2003. Consideration of Evidence for Noise Generation by Underwater Gas Pipelines and Presentation of Laboratory Data Relevant to the Acoustic Insulation Properties of Concrete Pipeline Cladding. ASL Environmental Sciences, Inc.

In addition to reviewing and interpreting the data presented previously, the analysis by Marko (2003) included a study of pulsed sound propagation through bare and concrete-coated steel plates and longitudinal pipe sections. This study demonstrated that the concrete coating proposed for the marine pipeline would reduce the intensity of sound moving into the water column. Even assuming sounds of relatively high frequencies and intensities, concrete coating would dampen the sounds to below ambient conditions in even the quietest ocean locations.

The report by Hoover & Keith, Inc. (2003) reviewed the data presented previously and presented modeling data based on actual GSX pipeline features, operating conditions, flow velocities, and sound transmission loss values. The results of the analysis indicate that the estimated noise radiated at approximately 3 feet from the underwater section of the pipeline would be equal to or lower than 30 dB at 16 kHz and above, which is below the minimum hearing threshold for

marine mammals such as toothed whales (e.g., toothed whales have hearing thresholds of 40 dB above 16 kHz).

Since sound from an underwater noise source decays until a surface is encountered, the pipeline noise would be even lower at moderate distances from the pipeline than the estimated level at approximately 3 feet. Consequently, the noise radiated from the underwater pipeline is unlikely to be detectable to most marine mammals even if the marine environment was relatively quiet. In addition, the average ambient noise levels in the ocean for quiet conditions are about 50 to 60 dB at frequencies above 16 kHz. Therefore, ambient noise would typically mask the ability of an animal to detect sounds below 50 dB.

~~The Marko study (2003) presents measurements of pulsed sound propagation through bare and concrete-coated steel plates and longitudinal pipe sections. The results suggest that the planned encasement of the proposed GSX pipeline in 1.6 inches of concrete would reduce the purported pipeline-generated noise to levels below those attainable in the quietest deep ocean locations. Further, these noise levels are well below existing estimates of the minimum orca auditory threshold.~~

~~The Kitech analysis (2003) contained a more realistic flow velocity inside the GSX pipeline and a further interpretation of the existing Centra Gas pipelines. Results indicate that, at a distance greater than 3.28 feet, noise that radiates from the underwater section of the pipeline would be below the minimum hearing threshold for marine mammals. In addition, because underwater sound from a noise source decays until a surface is encountered, pipeline noise would be even lower at moderate distances from the pipeline than the estimated level at 3.28 feet.~~

~~The results of the two studies show that the proposed pipeline would not generate sounds of high enough frequencies and intensities to negatively affect marine life.~~

Conclusions. The decibel scale of noise measurement is logarithmic in nature. For example, 30 dB is not 75% of 40 dB, but 50%. Fifty dB is 400% of 30 dB, and 60 dB is 800% of 30 dB. Therefore, the predicted level of noise from the pipeline would be half of the estimated low threshold of hearing for toothed whales, and one-quarter to one-eighth of the ambient noise level. Further, given two coexisting sounds that are 10 dB apart in sound level, the louder sound will mask the weaker, rendering it inaudible. Therefore, noise from the pipeline would have to be more than 40 dB to be audible, and 60 to 70 dB to mask the ambient noise under calm sea conditions.

In summary, the supplemental noise reports conclude, using established and accepted analytical techniques and credible biological data on marine mammal auditory response, that:

- The minimum predicted background noise in open marine waters is 50 to 60 dB under calm atmospheric and sea conditions.
- The minimum hearing threshold of the toothed whale is about 40 dB.
- The noise level of the pipeline into surrounding water will be about 30 dB.

Both of the supplemental reports support the conclusions in the FERC Final EIS that the GSX-US pipeline would not generate sounds of high enough frequencies and intensities to be audible

to toothed whales (e.g., Orca or harbor porpoise). Based on Ecology's review of the original and supplemental noise studies and existing noise regulations, and in the absence of other credible research, it cannot be concluded that the GSX-US pipeline would result in significant adverse noise impacts to fish or marine mammals.

GSX-Canada

This section summarizes the conclusions regarding marine pipeline noise impacts contained in Volume V - Environmental and Socio-Economic Impact Assessment (ESEIA) of the Georgia Strait Crossing Pipeline Limited Application for Certificate of Public Conveyance and Necessity to the National Energy Board of Canada (April 2001). The proposed project would generate noise as a result of vessel traffic, pipeline trenching, and pipeline operation. Vessel and trenching noise is likely to be similar to routine vessel traffic and dredging-type operations that periodically occur in the Strait of Georgia and Fraser River. No evidence is available to suggest that these noise sources are responsible in a material way for any observed changes in long-term fish abundance or distribution. These observations suggest the noise associated with this pipeline does not deter close association by certain species.

Noise during marine construction would be generated temporarily by the lay barge and trenching barge in addition to support vessels. Small boats associated with the operation are likely to produce sound with source intensity at approximately 3 feet ranging from 145 dB to 170 dB (Richardson et al. 1995). The lay barge and trenching barge may have dominant frequencies with an intensity of 169 dB to 198 dB at approximately 3 feet from the source (Richardson et al. 1995). During the trenching operation, noise would also be generated by trenching equipment on the seabed.

During pipeline operation, some noise would be generated by the proposed pipeline. Data obtained on part of an existing 10-inch epoxy-coated, high-pressure marine natural gas pipeline identified sound in the range of 60-72 dB (Birch et al. 2000). These values were about 10 times lower than the ambient values measured approximately 3,281 feet away, a factor largely attributable to high volumes of vessel traffic in the area at the time of sampling. The ambient noise levels were in the range of 70-80 dB. The proposed GSX-Canada pipeline has a larger diameter than the pipeline tested, and so would tend to have a lower frequency for any given operating pressure than a smaller diameter line. The proposed pipeline was estimated to have a maximum noise intensity in the range of 85+ 10 dB at approximately 3 feet from the source (Potter 2000).

While concern has been raised in regard to the potential for vessel activity and anthropogenic noise to negatively affect marine mammals, there is no indication that current vessel activities and associated noise (similar to that described above) within the southern Strait of Georgia and Strait of Juan de Fuca have negatively affected marine mammals. Toothed whales and some pinnipeds are not highly sensitive to low frequency sounds characteristic of many man-made noises (Richardson et al. 1995). The probable pipeline sounds would fall into this category, and they are within the range of other vessel noise already present in the area. Projected pipeline noise is believed to be below the hearing threshold for toothed whales.

Baleen whales are much more sensitive to low frequency sounds than other marine mammals (Richardson et al. 1995) and would likely have the ability to hear the pipeline during operations (Potter 2000). Among the concerns associated with low frequency sounds and baleen whales is the potential for “masking” low frequency whale communications. At the low frequencies involved, the masking effect of sound energy in decibels necessary to overcome masking effects is less than that for higher frequency potential sound masking sources. Research suggests that the maximum radius of influence of man-made sounds on baleen whales is at the point where the man-made noise diminishes below the ambient level (Richardson et al. 1995). Marine mammals regularly communicate in the range of 160 to 180 dB. Such signals decay by spherical spreading but would not fall below 60 to 80 dB until a distance of approximately 60 miles. At this distance, this sound level would still be 0 to 20 dB above the estimated pipeline noise at 0.6 mile (Potter 2000).

Terasen Gas Alternative

As with the proposed action, operational noise would be associated primarily with the increase in compression horsepower at three new sites and upgrades at other stations. Typical sources of noise at the compressor stations would include the turbine air intake, turbine exhaust, turbine lube oil cooler, turbine machinery surfaces, gas interstage coolers, and gas aftercoolers. Actual impacts would depend on the final location of the station, and its proximity to noise-sensitive areas.

Potential noise impacts resulting from pipeline looping would be associated with pipeline construction and would be similar to the proposed action. Noise emitted from the LNG facility would be minimal and limited to rotating machinery (Terasen Gas 2003).

No Action Alternative

Additional noise generated by the cogeneration facilities is not expected to materially affect the existing noise profile at the NorskeCanada sites. Noise emissions at the facilities would be controlled to a maximum of 85 decibels (dB). At a distance of 46.3 feet from the facility, noise levels would be 50 dB, or equivalent to the ambient level in an office environment (NorskeCanada 2003).

Mitigation Measures

Proposed Action

Because the two noise studies that were reviewed show the proposed pipeline would not generate sounds of high enough frequencies and intensities to negatively affect marine life, no additional mitigation is required.

Terasen Gas Alternative

Measures to minimize noise impacts at the compressor station would be similar to the proposed action and include special silencers on the turbine air intake and exhaust, locating the turbine in

an acoustically treated building, and gas aftercoolers. At the LNG facility, the liquefaction compressor and vaporization pumps would be electric and housed in acoustical structures designed to attenuate noise emissions. Noise levels at all facilities would comply with all applicable federal and provincial regulations.

No Action Alternative

Operation of equipment at all of the NorskeCanada mills is in compliance with ISO 9000 and ISO 14000 registration, and all applicable provincial and federal regulations.

Significant Unavoidable Adverse Impacts

No significant adverse impacts have been identified.